

# BIBIANA ROJAS, PH.D.

Nationality: Colombian  
Current place of residence: Jyväskylä, Finland

Current position:  
Academy of Finland Research Fellow

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Department of Biology and Environmental Science  
University of Jyväskylä  
P.O. Box 35  
FI-40014  
Finland

## EDUCATION

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- 2007-2012 PhD in Life and Environmental Sciences (Animal Behaviour and Sensory Ecology), Deakin University (Australia).  
Dissertation: 'The apparent paradox of colour pattern variation in aposematic frogs'.  
Advisor: Prof. John A. Endler (Oct 2007-Apr 2010 PhD student at the University of Exeter (UK), then transferred to Australia due to move of advisor)
- 2008 Postgraduate research course: Sensory Ecology, Lund University (Sweden)
- 2002-2005 MSc. in Biological Sciences - Biology (Behavioural Ecophysiology and Herpetology), University of Los Andes (Colombia)

## EMPLOYMENT AND RESEARCH EXPERIENCE

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- 2018-2023 Academy of Finland Research Fellow, University of Jyväskylä, Finland
- 2017 Visiting Fellow, Evolutionary Ecology Lab, Macquarie University, Australia (2 months)
- 2012-2018 Postdoctoral researcher, Centre of Excellence in Biological Interactions, University of Jyväskylä, Finland
- 2007-2010 Exeter Graduate Fellow, Teaching assistant, School of Psychology, University of Exeter, UK
- 2004 Guest Researcher (August-December), Konrad Lorenz Institute for Comparative Ethology (KLIV), Vienna, Austria. Host: Prof. Richard Wagner.
- 2002-2006 Associate Researcher, Group of Behavioural Ecophysiology and Herpetology, University of Los Andes (Colombia)
- 1997-2005 Research Assistant, Group of Behavioural Ecophysiology and Herpetology, University of Los Andes (Colombia), PI: Adolfo Amézquita

## AWARDS

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- 2018-2023 **Academy Research Fellowship**, Academy of Finland
- 2015 **'Scientific activity, public outreach and team spirit' award**, Centre of Excellence in Biological Interactions, University of Jyväskylä, Finland.

- 2012 **Rector's grant award** (for 'attracting exceptionally talented foreign postdocs'), University of Jyväskylä, Finland.
- 2010-2012 **HDR International Scholarship**. Deakin University, Australia.
- 2010 **Best poster prize**. ISBE Conference. Perth, Australia.
- 2007-2010 **Exeter Graduate Fellowship** (Competitively awarded PhD studentship). University of Exeter, UK.

## FUNDING

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Total obtained: ~€ 860,000

- 2018 **Nouragues Grant, Joint PI** (with Dr. Andrius Pašukonis, Stanford University, US), **CNRS** (National Centre for Scientific Research, France).
- 2018 **Academy Research Fellowship**, Academy of Finland – University of Jyväskylä, PI (approx. € 800,000)
- 2018 'Species Spectrum Research Centre' (Macquarie University, Australia) funds. Col (PI, Dr. Matthew Bulbert, Macquarie University)
- 2016 **Mobility grant, PI, Science Research Council, University of Jyväskylä**, to visit Dr. Darrell Kemp's laboratory at Macquarie University, Sydney, Australia (Spring 2017)
- 2015-2016 **Nouragues Grant, Joint PI** (with Dr. Andrius Pašukonis, University of Vienna, Austria), **CNRS** (National Centre for Scientific Research, France).
- 2013-2014 **Labex-CEBA Grant, Col, CNRS**, France. (PI, Brice Noonan, University of Mississippi, USA and Antoine Fouquet, CNRS, France).
- 2013-2014 **ASAB** (Association for the Study of Animal Behaviour, UK) **research grant, PI**
  - 2012 Conference grant, **PI**, Faculty of Science and Technology, Deakin University, Australia, to attend the 7th World Congress of Herpetology in Vancouver.
  - 2012 Conference grant, **PI**, Faculty of Science and Technology, Deakin University, Australia, to attend the 10th ISBE Meeting in Lund, Sweden.
  - 2010 ASAB conference grant to attend the ASAB winter meeting in London, **PI**
  - 2009 **Nouragues Grant, CNRS** (National Centre for Scientific Research, France). **PI**
  - 2008 **Nouragues Grant, CNRS** (National Centre for Scientific Research, France). **PI**
  - 2008 ASAB conference grant to attend the ASAB Easter meeting in Edinburgh.
  - 2004 Support funds from the **Austrian Academy of Sciences**, guest researcher at the Konrad Lorenz Institute for Comparative Ethology, Vienna, Austria. **PI**
  - 2002 Seed-grant, Faculty of Science, **University of Los Andes**. **Col**, (PI Adolfo Amézquita).
  - 2002 Seed-grant, Faculty of Science, **University of Los Andes**. **PI**

## PUBLICATIONS

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(\*) denotes corresponding author; (†) denotes senior authorship; underlined names correspond to supervised MSc students.

### Journal articles:

24. **Rojas, B.\***, Mappes, J. & Burdfield-Steel, E. 2019. Multiple modalities in insect warning displays have additive effects against wild avian predators. *Behavioral Ecology and Sociobiology* 73:37. DOI:10.1007/s00265-019-2643-6

23. Burdfield-Steel, E., Brain, M., **Rojas, B.** & Mappes, J. 2018. The price of safety: food deprivation in early life influences the efficacy of chemical defence in an aposematic moth. *Oikos* DOI:10.1111/oik.05420
22. **Rojas, B.\***, Burdfield-Steel, E., Gordon, S. P., De Pasqual, C., Hernández, L., Mappes, J., Nokelainen, O., Rönkä, K., Lindstedt, C. 2018. Multimodal aposematic signals and their emerging role in mate attraction. *Frontiers in Ecology and Evolution* **9**:93. DOI:10.3389/fevo.2018.00093
21. Rönkä, K., Mappes, J., Kiviö, R., Salokannas, J., Michalis, C. & **Rojas, B.^** Can multiple-model mimicry explain warning signal polymorphism in the wood tiger moth, *Arctia plantaginis* (Lepidoptera: Erebidae)? *Biological Journal of the Linnean Society* **124**: 237-260.
20. Henze, M. J., Lind, O., **Rojas, B.**, Mappes, J. & Kelber, A. 2018. An aposematic colour-polymorphic moth seen through the eyes of conspecifics and predators – sensitivity and colour discrimination in a tiger moth. *Functional Ecology*. DOI: 10.1111/1365-2435.13100
19. Burdfield-Steel, E., Pakkanen, H., **Rojas, B.**, Galarza, J. A. & Mappes, J. 2018. *De novo* synthesis of chemical defences in an aposematic moth. *Journal of Insect Science* **18**(2) DOI: 10.1093/jisesa/iey020
18. Rönkä, K., De Pasqual, C., Mappes, J., Gordon, S. P. & **Rojas, B.^** 2017. Colour alone matters: no predator generalisation among morphs of an aposematic moth. *Animal Behaviour* **135**: 153–163.
17. **Rojas, B.\*†**, Burdfield-Steel, E.†, Pakkanen, H., Suisto, K., Maczka, M., Schulz, S. & Mappes, J. 2017. How to fight multiple enemies: Target-specific chemical defences in an aposematic moth. *Proceedings of the Royal Society of London B*. **284**: 20171424 (†equal contribution).  
*Featured in:* Inside Science, Discover Magazine, Science Daily, Phys.org, Scientific American's 60 Seconds Science Podcast, 'Ciencia Café pa' Sumercé (Colombian initiative for scientific outreach), Biosphere Magazine.
16. White, T. E., **Rojas, B.**, Mappes, J., Rautiala, P. & Kemp, D. J. 2017. Colour and luminance contrasts predict the human detection of natural stimuli in complex visual environments. *Biology Letters* **13**: 20170375.
15. **Rojas, B.\*** 2016. Behavioural, ecological, and evolutionary aspects of diversity in frog colour patterns. *Biological Reviews*. DOI: 10.1111/brv.12269
14. Stynoski, J. L.\*†, Schulte, L. M.\*† & **Rojas, B.\*†** 2015. Poison frogs. Quick Guide. *Current Biology* **25**:R1026–R1028 (†equal contribution).
13. **Rojas, B.\*** 2015 Mind the gap: treefalls as drivers of parental tradeoffs. *Ecology & Evolution* **5**: 4028-4036. DOI: 10.1002/ece3.1648  
*Featured in:* Sciences et Avenir
12. **Rojas, B.\*†**, Gordon, S. P.† & Mappes, J. 2015 Frequency-dependent display activity in the aposematic wood tiger moth, *Parasemia plantaginis*. *Current Zoology* **61**:765-772 (invited contribution to a special issue on Anti-predator Colouration and Behaviour; †equal contribution).
11. Gordon, S. P., Kokko, H., **Rojas, B.**, Nokelainen, O. & Mappes, J. 2015 A colour polymorphism torn apart by both sexual and natural selection yet held together in space. *Journal of Animal Ecology* **84**:1555-1564. DOI:10.1111/1365-2656.12416  
*Featured in* a Special Virtual Issue on Evolutionary Ecology (editor's choice) in the Journal of Animal Ecology (2016)
10. Exnerová, A., Jezová, D., Štys, P., Doktorovová, L., **Rojas, B.** & Mappes, J. 2015 Different reactions to aposematic prey in two geographically distant populations of great tits. *Behavioral Ecology* **26**:1361-1370. DOI:10.1093/beheco/arv086
9. Hämäläinen, L., Valkonen, J., Mappes, J. & **Rojas, B.\*^** 2015. Visual illusions in predator-prey interactions: birds find moving patterned prey harder to catch. *Animal Cognition* **18**:1059-1068. DOI:10.1007/s10071-015-0874-0
8. **Rojas, B.\***, Valkonen, J. & Nokelainen, O. 2015 Aposematism. *Current Biology* **25**:R350-R351.

7. **Rojas, B.\***, Rautiala, P. & Mappes, J. 2014. Differential detectability of polymorphic warning signals under varying light environments. *Behavioural Processes* 109(B):164-172. Special issue on 'Animal Cognition in the Wild' (invited contribution)
6. **Rojas, B.\***, Devillechabrolle, J. & Endler, J. A. 2014. Paradox lost: colour pattern and movement are associated in an aposematic frog. *Biology Letters* 10:20140193.  
*Featured in:* Phys.org, Science News, Daily Mail, Sydney Morning Herald, Nature World News
5. **Rojas, B.\*** 2014 Strange parental decisions: fathers of the dyeing poison frog deposit their tadpoles in pools occupied by large cannibals. *Behavioral Ecology and Sociobiology* 68:551-559.  
*Featured in:* Science Magazine, Science Daily, Phys.org, Springer Select, The Scientist magazine, Der Standard.
4. **Rojas, B.\*** & Endler, J. A. 2013. Sexual dimorphism and intra-populational colour pattern variation in the aposematic frog *Dendrobates tinctorius*. Special Issue on the Evolutionary Ecology of Poison Frogs. *Evolutionary Ecology* 27:739-753. (BR invited contribution)  
*Featured by:* The Australasian Society for Evolution.
3. Ringler, E., **Rojas, B.**, Ringler, M. & Hödl, W. 2012. Characterisation of nine polymorphic microsatellite loci in the dyeing poison frog *Dendrobates tinctorius* (Dendrobatidae), and their cross-species utility in two other dendrobatoid species. *Herpetological Journal* 22:265-267.
2. Endler, J. A. & **Rojas, B.** 2009. The spatial pattern of natural selection when selection depends on experience. *American Naturalist* 173:E62-E78.
1. **Rojas, B.**, Amézquita, A.\* & Delgadillo, A. 2006. Matching and symmetry in the frequency recognition curve of the poison frog *Epipedobates trivittatus*. *Ethology* 112:564-571.

#### Non peer-reviewed:

5. Bernal, X. E., **Rojas, B.**, Pinto-E, M. A., Mendoza-Henao, Á. M., Herrera-Montes, A., Herrera-Montes, M. I. and Cáceres Franco, A. del Pilar. 2019. Empowering Latina scientists. *Science* 363:825.
4. **Rojas, B.** 2018. Comentario científico: Hacia un estudio integral del papel de los patrones de coloración en las interacciones entre depredadores y presas. *Boletín Colombiano de Biología Evolutiva* 6: 14-15.
3. **Rojas, B.\*** & Burdfield-Steel, E. Predator Defense. 2017. In: J. Vonk & T. K. Shackelford (Eds.). *Encyclopedia of Animal Cognition and Behavior*. Springer International Publishing. DOI: 10.1007/978-3-319-47829-6\_708-1
2. **Rojas, B.\***, Nokelainen, O., & Valkonen, J. Aposematism. 2017. In: T. K. Shackelford & V. A. Weekes-Shackelford (Eds.). *Encyclopedia of Evolutionary Psychological Science*. Springer. DOI:10.1007/978-3-319-16999-6\_2669-1
1. Nokelainen, O., **Rojas, B.**, & Valkonen, J. Camouflage. 2017. In: T. K. Shackelford & V. A. Weekes-Shackelford (Eds.). *Encyclopedia of Evolutionary Psychological Science*. Springer. DOI:10.1007/978-3-319-16999-6\_2665-1

#### Manuscripts in review/in revision:

5. Lawrence, J. P.\*‡, **Rojas, B.\*‡**, Fouquet, A., Mappes, J., Blanchette, A., Saporito, R., Bosque, R. J., Courtois, E., & Noonan, B. P. Weak warning signals can persist in the absence of gene flow. (‡Equal contribution). *In revision in PNAS*
4. **Rojas, B.\*** & Pašukonis, A. From habitat use to social behavior: natural history of a voiceless poison frog, *Dendrobates tinctorius*. *In revision in PeerJ* (see preprint: *bioRxiv* 515122; DOI:10.1101/515122).
3. Pašukonis, A., Loretto, M. C. & **Rojas, B.** How far do tadpoles travel in the rainforest? Parent-assisted dispersal in poison frogs. *In revision in Evolutionary Ecology*.
2. Schulte, L. M., Ringler, E.‡, **Rojas, B.‡** & Stynoski, J. L.‡ Developments in amphibian parental care research: history, present advances and future perspectives. (‡Equal contribution; listed in alphabetical order). *In revision in Herpetological Monographs*.

1. Rönkä, K., Valkonen, J., Nokelainen, O., **Rojas, B.**, Gordon, S., Burdfield-Steel, E., Tasane, T. & Mappes, J. Warning signal polymorphism despite positive frequency-dependent selection. *Under review*.

## POSTGRADUATE STUDENT SUPERVISION

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### *PhD*

University of Jyväskylä: Cristina Ottocento (2018-ongoing); Katja Rönkä (2014-2017)

### *Masters*

Erasmus Exchange Program, University of Jyväskylä-University of Padova: Cristina Ottocento (2018); Miriam Furlanetto (2017); Chiara De Pasqual (2015-2016)

University of Jyväskylä : Morgan Brain (2014-2016); Liisa Hämäläinen (2013-2014; **Awarded best thesis work** in the Department of Biology and Environmental Science)

University of Marseille (France): Jennifer Devillechabrolle (2011)

### *Bachelors*

University of Magdalena, Colombia: Sintana Rojas (2018); Tatiana Hernández (2019). Co-supervised with Luis Alberto Rueda, MSc.

## TEACHING EXPERIENCE

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### *Tertiary Education*

(2018) *Ethics and Philosophy of Science* (BENJ1006) course for PhD Students. University of Jyväskylä (Finland).

Lecture on Signal Evolution for the *Evolutionary Ecology and Life Histories* (EKOS1078) course for Masters students. University of Jyväskylä (Finland).

Field course "Tropical Ecology and Conservation", organized by the Organization for Tropical Studies (OTS). Las Cruces Research Station, Costa Rica, January 2018

(2016) Lectures for the Ecology (EKO 101b) course for Masters students. University of Jyväskylä (Finland).

(2007-2010) University of Exeter (UK), Teaching Assistant

*Undergraduate programs in Psychology and Animal Behaviour*: Biological Basis of Behaviour, Introduction to Animal Behaviour, Evolution of Behaviour, Ethological Methods, Sensory Ecology, Research methods in Psychology, Statistics

(2004) *Masters in Animal Behaviour and Welfare*: Behavioural Ecology, Ethological methods  
University of Vienna, Austria, through the Konrad Lorenz Institute for Comparative Ethology, teaching assistant: Practicals in Ethology.

### *Secondary education*

(2005-2007) Los Nogales School, Bogota, Colombia

Middle School (grades 5<sup>th</sup> through 8<sup>th</sup>): Basic Natural Sciences, High School (9<sup>th</sup> and 10<sup>th</sup> grades): Advanced Biology, High School (11<sup>th</sup> grade): Environmental Sciences

(2001-2004) Science teacher for Middle School (grades 5<sup>th</sup> through 8<sup>th</sup>)

## TEACHING QUALIFICATIONS

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(2014) Pedagogical Studies: 'Theoretical foundations of university teaching and learning' (5 ECTS credits) and 'Planning, practice and evaluation of teaching' (5 ECTS credits). August-December 2014, Faculty of Education, University of Jyväskylä, Finland.

(2009) Associate of the Higher Education Academy from April 2009, UK

## INVITED TALKS

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(2019) Centre for Biological Diversity Seminar Series, **University of St. Andrews**, St. Andrews, UK.

(2018) **National Museum of Natural Sciences**, Madrid, Spain; *'Role Model Seminars'*, within the 'Women in Biology Initiative' at the Faculty of Life Sciences, **University of Vienna**; *O'Connell Lab*, **Stanford University**, USA.

(2017) *Chemical Ecology Lab*, **University of Amsterdam**, The Netherlands; Symposia on *Colour and Genetics in Dendrobatid Poison Frogs* and *Women in Latin American Herpetology: challenges and achievements*, XI Latin American Congress of Herpetology. Quito, Ecuador; *The Lizard Lab*, **Macquarie University**, Sydney, Australia; *Hawkesbury Institute for the Environment Seminar*, **University of Western Sydney**, Sydney, Australia.

(2016): *Laboratoire d'Ecologie des Hydrosystèmes Naturels et Anthropisés*, **University of Lyon 1**, Lyon, France.

(2015): *Symposium on Amphibian Visual Ecology*. Vision Group, **Lund University**. Lund, Sweden.

(2014): *Communication Symposium*, **X Latin American Congress of Herpetology**, Cartagena, Colombia; *Animal Behaviour Seminar Series*, **University of Exeter**, Exeter, UK; *Behaviour, Ecology and Evolution Seminar Series*, **University of Cambridge**, Cambridge, UK. (

(2013): **Charles University**, Prague, Czech Republic; *Department of Cognitive Biology*, **University of Vienna**. Vienna, Austria.

## ORAL PRESENTATIONS AT SCIENTIFIC MEETINGS

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17 oral presentations, eight posters, and co-author of eight more presentations at international scientific meetings, i.e. meetings organized by the **European Society for Evolutionary Biology** (ESEB), the **International Society for Behavioral Ecology** (ISBE), and the **Association for the Study of Animal Behaviour** (ASAB), among others.

## MAIN EXTERNAL COLLABORATORS

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(1) Dr. Andrius Pašukonis, Stanford University, USA: Poison frog movement ecology and pool choice strategies in phytotelma-breeding frogs; (2) A/Prof. Lauren O'Connell, Stanford University, USA: Parental decision-making and larval aggression in dyeing poison frogs; (3) Dr. Eva Ringler and Dr. Max Ringler, University of Vienna, Austria: Spatial structure and mating systems in poison frogs. (4) Prof. John Endler, Deakin University, Australia: Analysis and quantification of animal colour patterns

## LEADERSHIP AND SERVICE

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(2016-2019): Examiner of four MSc Thesis for University of Los Andes (Colombia), University of Jyväskylä (Finland) and Macquarie University (Australia).

(2017): Examination committee, PhD Thesis, Lund University.

(2015-2017): Departmental Seminar organiser, Department of Biology and Environmental Science, University of Jyväskylä.

(2013-2015): 'Darwin Meeting' organiser. Centre of Excellence in Biological Interactions, University of Jyväskylä.

2013-2019: Creator and administrator of Social Media for the Centre of Excellence in Biological Interactions and the Predator-Prey Interactions Group. University of Jyväskylä.

Since 2016: Member of the *Scientific Committee* of COLEVOL (Colombian Association of Evolutionary Biology).

## SCIENCE COMMUNICATION AND OUTREACH

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My research has been covered by several different scientific outlets, such as Science Daily, Discover Magazine, the 'Science Shot' section in Science Magazine, Scientific American's '60 second science' podcast, The Scientist, Inside Science, Phys.Org, Biosphere Magazine, Discover Magazine, among others. Lately, I also contributed to a recently launched science outreach project in my home country, Colombia, called 'Ciencia Café Pa' Sumercé' (<https://cienciacafersumerce.wordpress.com/blog>), where I was interviewed to explain my latest findings (target-specific chemical defences in an aposematic moth) to a lay audience. For further details about media coverage, please visit my personal website: [www.bibianarojas.co](http://www.bibianarojas.co)

## PROFESSIONAL MEMBERSHIPS

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European Society for Evolutionary Biology (ESEB); Association for the Study of Animal Behaviour (ASAB); International society for Behavioral Ecology (ISBE); Asociación Colombiana de Herpetología (ACh).

## PEER-REVIEW

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*Journal articles:* Peer review of 72 papers for 36 journals such as PNAS; Ecology Letters; American Naturalist; Proceedings of the Royal Society of London B; Functional Ecology; Scientific Reports; Biology Letters; Royal Society Open Science; Animal Behaviour; Behavioral Ecology; Behavioral Ecology and Sociobiology; Evolutionary Ecology; Journal of Chemical Ecology; Biological Journal of the Linnean Society; Ecology and Evolution; Oecologia; Journal of Urban Ecology; Frontiers in Ecology and Evolution; Communications Biology; Ethology; and Journal of Zoology, among others.

*Grants:* **(2018)** "Botas al Campo (Boots on the Ground)" Research Grants, Colombian Herpetological Society (ACH), Colombia

**(2016)** "SDE/GWIS (Sigma Delta Epsilon/Graduate Women in Science) Fellowships", USA; "IKIAM Seed Funding", Universidad Regional Amazónica IKIAM, Ecuador.

## FIELDWORK EXPERIENCE

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COLOMBIA: Andean High-lands near Bogotá, (1997-2002); Chingaza Natural Park (Paramo ecosystem, 1997-2002); Villavicencio (Piedmont ecosystem, 1999-2001); Leticia, Colombian Amazon (Tropical Rainforest: TRF, 2002 & 2003); Yotoco Private Reserve, Quibdó & Acandí (Biogeographic Chocó, TRF, 2004, 2005). UNITED KINGDOM: Lundy Island (2008 & 2009). COSTA RICA: Osa Península, Pacific coast (TRF, 2008). FRENCH GUIANA: Les Nouragues Research Station (TRF, 2009-2013; 2016; 2019); other localities (TRF, 2013). FINLAND: Central Finland (2013-2017). GEORGIA: Caucasus region (Alpine meadows, 2013-2018). ESTONIA: Parnu region (2016).

## LANGUAGES

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Spanish: Native speaker; English: Full proficiency; French: Intermediate level; German: Basic level.

## ACADEMIC REFERENCES

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Prof. John A. Endler

Deakin University

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Prof. Johanna Mappes

University of Jyväskylä

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A/Prof. Almut Kelber

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